AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all previous versions thereof.

1. (Previously Amended) A method for process monitoring, comprising:

directing a beam of charged particles (i) towards a sample having a first layer that is at least partly conductive and a second layer formed over the first layer and having contact openings therein, and (ii) along a beam axis that deviates substantially in angle from a normal to a surface of the sample, so as to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample;

creating, from measurements of (i) a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations and (ii) a secondary electron current emitted from the sample responsive to the beam of charged particles,a map of at least the region of the sample indicating the specimen current measured in response to the irradiation at the plurality of the locations; and

analyzing, using the map of the specimen current, a process used to create the contact openings.

2. (Previously Amended) The method according to claim 1, wherein creating the map comprises mapping the secondary electron current together with the specimen current.

3. (Cancelled)

4. (Previously Amended) The method according to claim 1, wherein analyzing the process comprises assessing, based on the map, at least one of a characteristic depth and a characteristic width of the contact openings at each of the plurality of locations.

5. (Previously Amended) The method according to claim 1, wherein analyzing the process comprises assessing, based on the map, non-uniformities in the process used to create the contact openings.

6. (Original) The method according to claim 5, wherein assessing the non-uniformities comprises assessing variations over the region of the sample.

7. (Original) The method according to claim 5, wherein assessing the non-uniformities comprises assessing variations between different, first and second samples.

8. (Previously Amended) The method according to claim 5, and comprising applying corrective action to the process responsively to analyzing the map.

9. (Previously Amended) The method according to claim 1, wherein analyzing the process comprises assessing, based on the map, an alignment between the contact openings in the second layer and a structure in the first layer.

10. (Original) The method according to claim 1, wherein the sample comprises a semiconductor wafer.

11. (Original) The method according to claim 10, wherein at least some of the locations are located on different dies of the wafer.

12. (Original) The method according to claim 1, wherein directing the beam of charged particles comprises selecting the locations to irradiate such that the one or more of the contact openings in each location among the plurality of locations are characteristic of the contact openings in a respective area of the location.

13. (Original) The method according to claim 1, wherein at least one of the contact openings is a contact hole.

14. (Original) The method according to claim 1, wherein at least one of the contact openings is a trench.

15. (Original) The method according to claim 1, wherein the contact openings have side walls and a bottom, and wherein directing the beam of charged particles comprises angling the beam so that more of the charged particles strike the side walls than strike the bottom.

16. (Previously Amended) The method according to claim 1, wherein analyzing the process comprises assessing, based on the map, whether a contaminant residue is present within the contact openings.

17. (Original) The method according to claim 1, and comprising negatively precharging the surface of the sample in proximity the contact openings, so as to facilitate measurement of the specimen current.

18. (Previously Amended) Apparatus for testing a sample comprising:

a particle beam source adapted to direct a beam of charged particles (i) towards a sample having a first layer that is at least partly conductive and a second layer formed over the first layer and having contact openings therein, and (ii) along a beam axis that deviates substantially in angle from a normal to a surface of the sample, so as to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample;

a current measuring device adapted to measure a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations;

a secondary electron detector adapted to measure a secondary electron current emitted from the sample responsive to the beam of charged particles;

a controller adapted to create, from measurements of the specimen current and the secondary electron current, a map of at least the region of the sample indicating the specimen current measured in response to the irradiation at the plurality of locations; and

a workstation adapted to permit analysis, using the map of the specimen current, a process used to create the contact openings.

19.-20. (Cancelled)

21. (Original) The apparatus according to claim 18, wherein the map is indicative of at least one of a characteristic depth and a characteristic width of the contact openings at each of the plurality of locations.

22. (Original) The apparatus according to claim 18, wherein the map is indicative of non-uniformities in a process used to create the contact openings.

23. (Original) The apparatus according to claim 22, wherein the non-uniformities comprise variations over the region of the sample.

24. (Original) The apparatus according to claim 22, wherein the non-uniformities comprise variations between different, first and second samples.

25. (Original) The apparatus according to claim 22, wherein the controller is adapted to apply corrective action to the process responsively to the map.

26. (Original) The apparatus according to claim 18, wherein the map is indicative of an alignment between the contact openings in the second layer and a structure in the first layer.

27. (Original) The apparatus according to claim 18, wherein the sample comprises a semiconductor wafer.

28. (Original) The apparatus according to claim 27, wherein at least some of the locations are located on different dies of the wafer.

29. (Original) The apparatus according to claim 18, wherein the locations to be irradiated are selected such that the one or more of the contact openings in each location among the plurality of locations are characteristic of the contact openings in a respective area of the location.

30. (Original) The apparatus according to claim 18, wherein at least one of the contact openings is a contact hole.

31. (Original) The apparatus according to claim 18, wherein at least one of the contact openings is a trench.

32. (Original) The apparatus according to claim 18, wherein the contact openings have side walls and a bottom, and wherein the beam is angled so that more of the charged particles strike the side walls than strike the bottom.

33. (Original) The apparatus according to claim 18, wherein the controller is adapted to assess, based on the specimen current, whether a contaminant residue is present within the contact openings.

34. (Original) The apparatus according to claim 18, wherein the particle beam source is adapted to negatively precharge the surface of the sample in proximity the contact openings, so as to facilitate measurement of the specimen current by the current measuring device.

35.-38. (Cancelled)